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CHAPTER 21

TABLES AND DATA

1. Tables

The tables in this chapter have been copied by permission of the groups that are specifically mentioned. It did not seem wise to abridge those tables since they are the basis for most North American cable designs, especially in the power field.

Figure 21-1

Stress Concentration at Tip of a Conductive Ellipsoid Placed in a Uniform Electrical Field

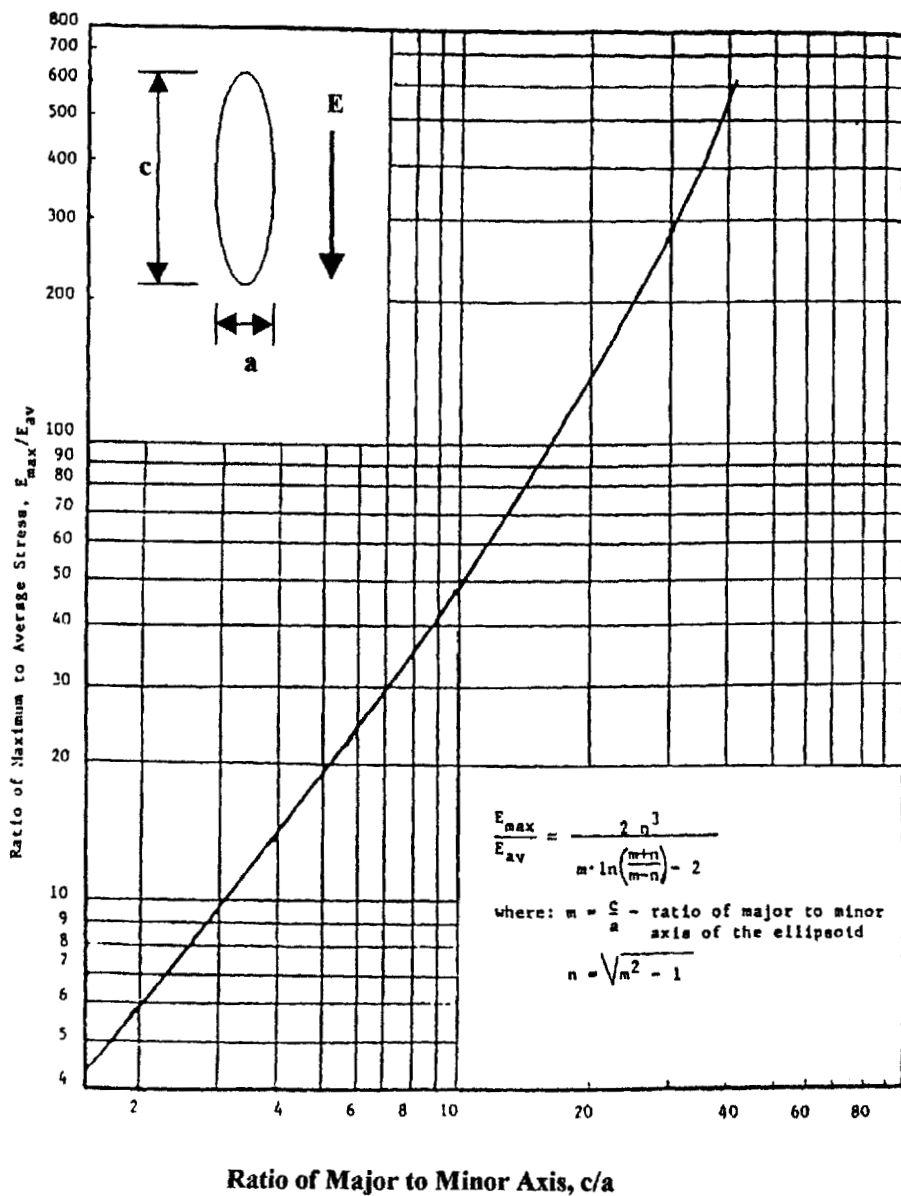


Figure 21-2

Typical Leakage Curve of dc Current, Assuming Constant Voltage

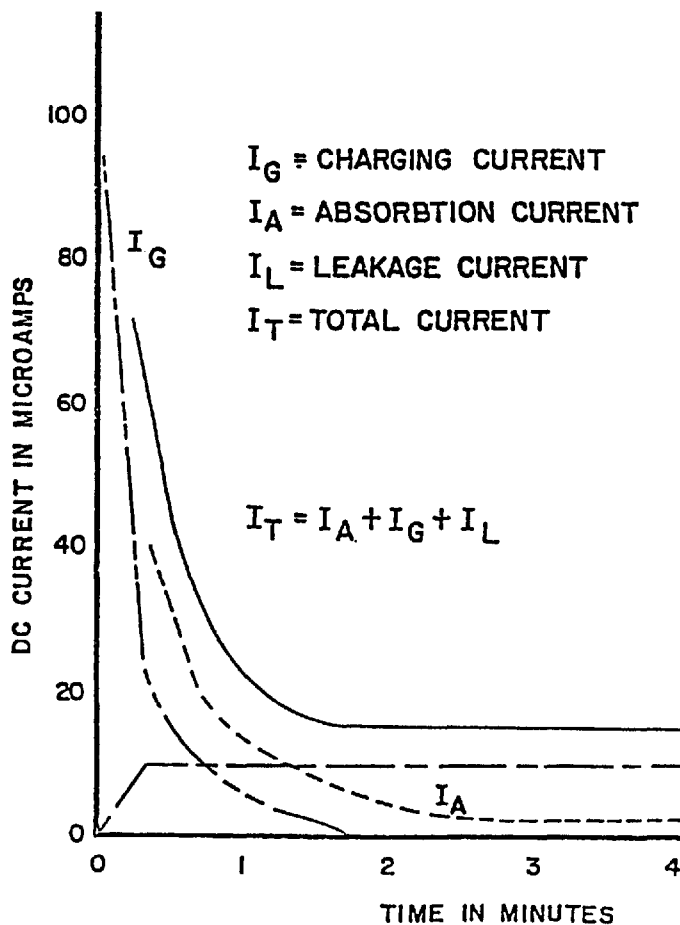


Table 21-1

Nominal Direct Current Resistance In Ohms Per 1000 Feet** at 25°C (77°F) of Solid and Concentric Lay stranded Conductor

Conductor Size AWG or kcmil	Solid			Concentric Lay Stranded*					
	Aluminum	Copper		Aluminum Class, B, C, D	Copper				
		Uncoated	Coated		Uncoated Class B, C, D	Coated Class B Class C Class D			
22	27.1	16.5	17.2	27.4	16.7	17.9	...	...	...
20	16.9	10.3	10.7	17.3	10.5	11.1	...	...	...
19	13.5	8.20	8.52	13.7	8.33	8.83	...	...	...
18	10.7	6.51	6.76	10.9	6.67	7.07	...	...	...
17	8.45	5.15	5.35	8.54	5.21	5.52	...	...	...
16	6.72	4.10	4.26	6.85	4.18	4.43	...	...	...
15	5.32	3.24	3.37	5.41	3.30	3.43	...	...	...
14	4.22	2.57	2.67	4.31	2.63	2.73	2.79	2.83	2.89
13	3.34	2.04	2.12	3.41	2.08	2.16	2.21	2.22	2.22
12	2.66	1.62	1.68	2.72	1.66	1.72	1.75	1.75	1.75
11	2.11	1.29	1.34	2.15	1.31	1.36	1.36	1.39	1.39
10	1.67	1.02	1.06	1.70	1.04	1.08	1.08	1.11	1.11
9	1.32	0.808	0.831	1.35	0.825	0.856	0.856	0.874	0.874
8	1.05	0.640	0.659	1.07	0.652	0.678	0.678	0.680	0.680
7	0.833	0.508	0.522	0.851	0.519	0.538	0.538	0.538	0.538
6	0.661	0.403	0.414	0.675	0.411	0.427	0.427	0.427	0.427
5	0.524	0.319	0.329	0.534	0.325	0.338	0.339	0.339	0.339
4	0.415	0.253	0.261	0.424	0.258	0.269	0.269	0.269	0.269
3	0.329	0.201	0.207	0.336	0.205	0.213	0.213	0.213	0.213
2	0.261	0.159	0.164	0.266	0.162	0.169	0.169	0.169	0.169
1	0.207	0.126	0.130	0.211	0.129	0.134	0.134	0.134	0.134
1/0	0.164	0.100	0.102	0.168	0.102	0.106	0.106	0.106	0.106
2/0	0.130	0.0794	0.0813	0.133	0.0810	0.0842	0.0842	0.0842	0.0842
3/0	0.103	0.0630	0.0645	0.105	0.0642	0.0667	0.0669	0.0669	0.0669
4/0	0.0819	0.0500	0.0511	0.0836	0.0510	0.0524	0.0530	0.0530	0.0530
250	0.0694	...	...	0.0707	0.0431	0.0448	0.0448	0.0448	0.0448
300	0.0578	...	...	0.0590	0.0360	0.0374	0.0374	0.0374	0.0374
350	0.0495	...	...	0.0505	0.0308	0.0320	0.0320	0.0320	0.0320
400	0.0433	...	...	0.0442	0.0269	0.0277	0.0280	0.0280	0.0280
450	0.0385	...	...	0.0393	0.0240	0.0246	0.0249	0.0249	0.0249
500	0.0347	...	...	0.0354	0.0216	0.0222	0.0224	0.0224	0.0224
550	...	...	...	0.0321	0.0196	0.0204	0.0204	0.0204	0.0204
600	...	...	...	0.0295	0.0180	0.0187	0.0187	0.0187	0.0187
650	...	...	...	0.0272	0.0166	0.0171	0.0172	0.0173	0.0173
700	...	...	...	0.0253	0.0154	0.0159	0.0160	0.0160	0.0160
750	...	...	...	0.0236	0.0144	0.0148	0.0149	0.0150	0.0150
800	...	...	...	0.0221	0.0135	0.0139	0.0140	0.0140	0.0140
900	...	...	...	0.0196	0.0120	0.0123	0.0126	0.0126	0.0126
1000	...	...	...	0.0177	0.0108	0.0111	0.0111	0.0112	0.0112
1100	...	...	...	0.0161	0.00981	0.0101	0.0102	0.0102	0.0102
1200	...	...	...	0.0147	0.00899	0.00925	0.00934	0.00934	0.00934
1250	...	...	...	0.0141	0.00863	0.00888	0.00897	0.00897	0.00897
1300	...	...	...	0.0136	0.00830	0.00854	0.00861	0.00862	0.00862
1400	...	...	...	0.0126	0.00771	0.00793	0.00793	0.00801	0.00801
1500	...	...	...	0.0118	0.00719	0.00740	0.00740	0.00747	0.00747
1600	...	...	...	0.0111	0.00674	0.00694	0.00700	0.00700	0.00700
1700	...	...	...	0.0104	0.00634	0.00653	0.00659	0.00659	0.00659
1750	...	...	...	0.0101	0.00616	0.00634	0.00640	0.00640	0.00640
1800	...	...	...	0.00982	0.00599	0.00616	0.00616	0.00622	0.00622
1900	...	...	...	0.00931	0.00568	0.00584	0.00584	0.00589	0.00589
2000	...	...	...	0.00885	0.00539	0.00555	0.00555	0.00560	0.00560
2500	...	...	...	0.00715	0.00436	0.00448	...	...	...
3000	...	...	...	0.00596	0.00363	0.00374	...	...	...
3500	...	...	...	0.00515	0.00314	0.00323	...	...	...
4000	...	...	...	0.00451	0.00275	0.00283	...	...	...
4500	...	...	...	0.00405	0.00247	0.00254	...	...	...
5000	...	...	...	0.00364	0.00222	0.00229	...	...	...

* Concentric lay stranded includes compressed and compact conductors.

** Resistance values in milliohms per meter shall be obtained by multiplying the above values by 3.28.

Table 21-2

**Nominal Direct Current Resistance in Ohms Per 1000 Feet*
At 25°C (77°F) For Flexible Aluminum Conductors**

Conductor Size AWG or kcmil	Class G	Class H	Class I
8	...	...	1.07
7	0.858	...	0.850
6	0.681	...	0.687
5	0.540	...	0.545
4	0.428	...	0.432
3	0.340	...	0.343
2	0.269	0.272	0.272
1	0.216	...	0.216
1/0	0.171	0.172	0.172
2/0	0.136	0.136	0.137
3/0	0.107	0.108	0.109
4/0	0.0852	0.0857	0.0861
250	0.0725	0.0728	0.0735
300	0.0604	0.0607	0.0613
350	0.0518	0.0520	0.0525
400	0.0453	0.0455	0.0460
450	0.0403	0.0405	0.0409
500	0.0363	0.0364	0.0368
550	0.0331	0.0334	0.0334
600	0.0304	0.0306	0.0306
650	0.0280	0.0283	0.0286
700	0.0260	0.0263	0.0265
750	0.0243	0.0245	0.0247
800	0.0228	0.0230	0.0232
900	0.0202	0.0204	0.0206
1000	0.0182	0.0184	0.0186
1100	0.0166	0.0167	0.0169
1200	0.0152	0.0153	0.0155
1250	0.0146	0.0147	0.0148
1300	0.0140	0.0141	0.0143
1400	0.0130	0.0131	0.0133
1500	0.0121	0.0123	0.0124
1600	0.0115	0.0115	0.0116
1700	0.0108	0.0108	0.0109
1750	0.0105	0.0105	0.0106
1800	0.0102	0.0102	0.0103
1900	0.00968	0.00968	0.00977
2000	0.00919	0.00919	0.00928

*Resistance values in milliohms per meter shall be obtained by multiplying the above values by 3.28.

Table 21-3

**Nominal Direct Current Resistance in Ohms Per 1000 Feet* At 25°C (77°F)
For Flexible Annealed Copper Conductors**

Conductor Size AWG or kcmil	Uncoated					Coated				
	Class G	Class H	Class I	Class K	Class M	Class G	Class H	Class I	Class K	Class M
20	...	...	...	10.6	10.6	...	...	...	11.4	11.4
18	...	...	...	6.66	6.66	...	...	...	7.15	7.15
16	...	...	...	4.18	4.18	...	...	...	4.49	4.49
14	2.65	...	...	2.62	2.62	2.81	...	...	2.82	2.82
12	1.67	...	...	1.65	1.68	1.77	...	...	1.77	1.81
10	1.05	...	1.04	1.04	1.06	1.11	...	1.08	1.12	1.14
9	0.832	...	0.824	0.840	0.840	0.884	...	0.857	0.902	0.902
8	0.660	0.666	0.653	0.666	0.666	0.701	0.708	0.679	0.715	0.715
7	0.523	0.528	0.518	0.528	0.533	0.544	0.561	0.539	0.567	0.573
6	0.415	0.419	0.419	0.419	0.423	0.432	0.445	0.436	0.450	0.454
5	0.329	0.332	0.332	0.332	0.336	0.342	0.353	0.346	0.357	0.360
4	0.261	0.263	0.263	0.263	0.266	0.271	0.280	0.274	0.283	0.286
3	0.207	0.209	0.209	0.211	0.213	0.215	0.222	0.217	0.227	0.227
2	0.164	0.166	0.166	0.167	0.169	0.171	0.172	0.172	0.180	0.181
1	0.131	0.132	0.131	0.133	0.134	0.137	0.140	0.137	0.142	0.144
1/0	0.104	0.105	0.105	0.105	0.106	0.108	0.109	0.109	0.113	0.114
2/0	0.0826	0.0830	0.0834	0.0842	0.0850	0.0859	0.0863	0.0868	0.0904	0.0913
3/0	0.0655	0.0659	0.0662	0.0668	0.0674	0.0682	0.0685	0.0688	0.0717	0.0724
4/0	0.0520	0.0522	0.0525	0.0530	0.0535	0.0541	0.0543	0.0546	0.0569	0.0574
250	0.0442	0.0444	0.0448	0.0448	0.0453	0.0460	0.0462	0.0466	0.0481	0.0486
300	0.0368	0.0370	0.0374	0.0374	0.0377	0.0383	0.0385	0.0389	0.0401	0.0405
350	0.0316	0.0317	0.0320	0.0323	0.0323	0.0328	0.0330	0.0333	0.0347	0.0347
400	0.0276	0.0278	0.0280	0.0283	0.0283	0.0287	0.0289	0.0291	0.0304	0.0304
450	0.0246	0.0247	0.0249	0.0251	0.0251	0.0255	0.0257	0.0259	0.0270	0.0262
500	0.0221	0.0222	0.0224	0.0226	0.0226	0.0230	0.0231	0.0233	0.0243	0.0243
550	0.0202	0.0204	0.0204	0.0206	0.0206	0.0210	0.0212	0.0212	0.0221	0.0221
600	0.0185	0.0187	0.0187	0.0189	0.0189	0.0192	0.0194	0.0194	0.0203	0.0202
650	0.0171	0.0172	0.0174	0.0174	0.0174	0.0178	0.0179	0.0181	0.0187	0.0187
700	0.0159	0.0168	0.0162	0.0162	0.0162	0.0165	0.0167	0.0168	0.0174	0.0174
750	0.0148	0.0149	0.0151	0.0151	0.0151	0.0154	0.0155	0.0157	0.0162	0.0162
800	0.0139	0.0140	0.0141	0.0141	0.0141	0.0144	0.0146	0.0147	0.0152	0.0152
900	0.0123	0.0125	0.0126	0.0126	0.0126	0.0128	0.0130	0.0131	0.0135	0.0135
1000	0.0111	0.0112	0.0113	0.0113	0.0113	0.0115	0.0117	0.0118	0.0122	0.0121
1100	0.0101	0.0102	0.0103	...	...	0.0105	0.0106	0.0107	...	...
1200	0.00925	0.00934	0.00943	...	...	0.00962	0.00971	0.00981	...	...
1250	0.00888	0.00897	0.00905	...	...	0.00924	0.00933	0.00941	...	...
1300	0.00854	0.00862	0.00870	...	...	0.00888	0.00897	0.00905	...	...
1400	0.00793	0.00801	0.00808	...	...	0.00825	0.00833	0.00841	...	...
1500	0.00740	0.00747	0.00754	...	...	0.00770	0.00777	0.00785	...	...
1600	0.00701	0.00701	0.00707	...	...	0.00729	0.00729	0.00735	...	...
1700	0.00659	0.00659	0.00666	...	...	0.00686	0.00686	0.00692	...	...
1750	0.00641	0.00641	0.00647	...	...	0.00665	0.00666	0.00672	...	...
1800	0.00623	0.00623	0.00629	...	...	0.00648	0.00648	0.00654	...	...
1900	0.00590	0.00590	0.00596	...	...	0.00614	0.00614	0.00619	...	...
2000	0.00561	0.00561	0.00566	...	...	0.00583	0.00583	0.00588	...	...

Resistance values in milliohms per meter shall be obtained by multiplying the above values by 3.28.

Table 21-4

Nominal Diameters for Copper and Aluminum Conductors

Conductor		Nominal Diameters*					
		Concentric Lay Stranded					
Size		Solid	Compact	Compressed	Class B	Class C	Class D
AWG	kcmil	Inch	Inch	Inch	Inch	Inch	Inch
22	0.812	0.0253	...	...	...	...	...
20	1.02	0.0320	...	...	...	...	...
19	1.29	0.0359	...	...	...	...	...
18	1.62	0.0403	...	...	...	...	...
17	2.05	0.0453	...	...	...	...	...
16	2.58	0.0508	...	...	...	...	...
15	3.26	0.0571	...	0.0629	0.0648	...	...
14	4.11	0.0641	...	0.0704	0.0727	0.0735	0.0735
13	5.18	0.0720	...	0.0792	0.0816	0.0825	0.0826
12	6.53	0.0808	...	0.0888	0.0915	0.0925	0.0931
11	8.23	0.0907	...	0.0998	0.103	0.104	0.104
10	10.38	0.1019	...	0.112	0.116	0.117	0.117
9	13.09	0.1144	...	0.126	0.130	0.131	0.132
8	16.31	0.1285	0.134	0.141	0.146	0.148	0.148
7	20.82	0.1443	...	0.158	0.164	0.166	0.166
6	26.24	0.1620	0.169	0.178	0.184	0.186	0.186
5	33.09	0.1819	...	0.200	0.206	0.208	0.209
4	41.74	0.2043	0.213	0.225	0.232	0.234	0.235
3	52.62	0.2294	0.238	0.252	0.260	0.263	0.264
2	66.36	0.2576	0.268	0.283	0.292	0.296	0.297
1	83.69	0.2893	0.299	0.322	0.332	0.333	0.333
1/0	105.6	0.3249	0.336	0.361	0.372	0.374	0.374
2/0	133.1	0.3648	0.376	0.406	0.418	0.420	0.420
3/0	167.8	0.4096	0.423	0.456	0.470	0.471	0.472
4/0	211.6	0.4600	0.475	0.512	0.528	0.529	0.530
	250	0.5000	0.520	0.558	0.575	0.576	0.576
	300	0.5477	0.570	0.611	0.630	0.631	0.631
	350	0.5916	0.616	0.661	0.681	0.681	0.682
	400	0.6325	0.659	0.706	0.728	0.729	0.729
	450	0.6708	0.700	0.749	0.772	0.773	0.773
	500	0.7071	0.736	0.789	0.813	0.814	0.815
	550	...	0.775	0.829	0.855	0.855	0.855
	600	...	0.813	0.866	0.893	0.893	0.893
	650	...	0.845	0.901	0.929	0.930	0.930
	700	...	0.877	0.935	0.964	0.965	0.965
	750	...	0.908	0.968	0.998	0.999	0.998
	800	...	0.938	1.000	1.030	1.032	1.032
	900	...	0.999	1.061	1.094	1.093	1.095
	1000	...	1.060	1.117	1.152	1.153	1.153
	1100	...	...	1.173	1.209	1.210	1.211
	1200	...	...	1.225	1.263	1.264	1.264
	1250	...	...	1.251	1.289	1.290	1.290
	1300	...	...	1.275	1.314	1.316	1.316
	1400	...	...	1.321	1.365	1.365	1.365
	1500	...	...	1.370	1.412	1.413	1.413
	1600	...	...	1.415	1.459	1.460	1.460
	1700	...	...	1.459	1.504	1.504	1.504
	1750	...	...	1.480	1.526	1.527	1.527
	1800	...	...	1.502	1.548	1.548	1.549
	1900	...	...	1.542	1.590	1.590	1.591
	2000	...	...	1.583	1.632	1.632	1.632

* Diameters in millimeters shall be obtained by multiplying the above values in inches by 25.4.

Table 21-5

Factors** for Determining Nominal Resistance of Stranded Conductors Per 1000 Feet							
Conductivity, Percent	Diameter of Individual Coated Copper Wires in Inches for Stranded Conductors						
	All Sizes, Uncoated		0.460 to 0.290, Inclusive	Under 0.290 to 0.103, Inclusive	Under 0.103 to 0.0201, Inclusive	Under 0.0201 to 0.0111, Inclusive	Under 0.0111 to 0.0010, Inclusive
	Aluminum	Copper					
	61	100	97.66	97.16	96.16	94.16	93.15
	25 °C	25 °C	25 °C	25 °C	25 °C	25 °C	25 °C
<i>Rope Stranded</i>							
49 strands	17865	10892	11153	11210	11327	11568	...
133 strands	18038	10998	11261	11319	11437	11681	...
259 strands	18125	11051	11315	11374	11492	11737	...
427 strands	18212	11104	11370	11428	11547	11793	...
Over 427 strands	18385	11209	11478	11537	11657	11905	...
<i>Bunch Stranded</i>							
All sizes	17691	10786	...	...	11217	11456	11579
<i>Rope-stranded Bunches</i>							
7 ropes of bunched strand	18038	10998	...	...	11437	11681	11806
19, 37, or 61 ropes of bunched strand	18212	11104	...	...	11547	11793	11920
7 × 7 ropes of bunched strand	18385	11209	...	...	11657	11905	12033
19, 37, or 61 × 7 ropes of bunched strand	18559	11315	...	...	11767	12018	12147
<i>Concentric Stranded</i>							
Up to 2000 kcmil	17692	10786	11045	11102	11217	11456	11580
> 2000 to 3000 kcmil	17865	10892	11153	11211	11327	11568	11694
> 3000 to 4000 kcmil	18039	10998	11261	11319	11437	11680	11807
> 4000 to 5000 kcmil	18212	11104	11369	11428	11547	11792	11921

The factors given in Table 21-5 are based on the following

Resistivity

1. A volume resistivity of 10.575 $\Omega \cdot \text{cmil}/\text{ft}$ (100 % conductivity) at 25 °C for uncoated (bare) copper.
2. A 25 °C volume resistivity converted from the 20 °C values specified in ASTM B 33 or ASTM B 189 for coated copper.
3. A volume resistivity of 17.345 $\Omega \cdot \text{cmil}/\text{ft}$ (61.0% conductivity) at 25 °C for aluminum.

Copper Conductors, Class M
Each Individual Strand 34 AWG, 0.0063 Inch (0.160 mm)

Conductor Size, AWG or kcmil	Suggested Construction	Approximate Number of Strands	Approximate Outside Diameter		Approximate Weight	
			inches	mm	Pounds per 1000 Feet	g/m
20	1 × 26	26	0.038	0.97	3.2	4.74
18	1 × 41	41	0.048	1.22	5.0	7.48
16	1 × 65	65	0.060	1.52	8.0	11.9
14	1 × 104	104	0.078	1.98	12.8	19.0
12	7 × 24	168	0.101	2.57	21.0	31.2
10	7 × 37	259	0.126	3.20	32.5	48.2
9	7 × 48	336	0.146	3.71	42	62.5
8	7 × 60	420	0.162	4.11	53	78.1
7	19 × 28	532	0.196	4.98	67	100.0
6	19 × 35	665	0.215	5.46	84	125
5	19 × 44	836	0.240	6.10	105	157
4	19 × 56	1064	0.269	6.83	134	200
3	7 × 7 × 27	1323	0.305	7.75	169	251
2	7 × 7 × 34	1666	0.337	8.56	212	316
1	7 × 7 × 43	2107	0.376	9.53	268	399
1/0	7 × 7 × 54	2646	0.423	10.7	337	501
2/0	19 × 7 × 25	3325	0.508	12.9	427	636
3/0	19 × 7 × 32	4256	0.576	14.6	547	814
4/0	19 × 7 × 40	5320	0.645	16.4	684	1020
250	19 × 7 × 48	6384	0.713	18.1	821	1220
300	19 × 7 × 57	7581	0.768	19.5	975	1450
350	37 × 7 × 34	8806	0.825	21.0	1130	1685
400	37 × 7 × 39	10101	0.901	22.9	1300	1930
450	37 × 7 × 44	11396	0.940	23.9	1465	2180
500	37 × 7 × 49	12691	0.997	25.3	1630	2430
550	61 × 7 × 32	13664	1.035	26.3	1755	2615
600	61 × 7 × 35	14945	1.084	27.5	1920	2860
650	61 × 7 × 38	16226	1.133	28.8	2085	3105
700	61 × 7 × 41	17507	1.183	30.0	2250	3350
750	61 × 7 × 44	18788	1.207	30.7	2415	3595
800	61 × 7 × 47	20069	1.256	31.9	2580	3840
900	61 × 7 × 53	22631	1.331	33.8	2910	4330
1000	61 × 7 × 59	25193	1.404	35.7	3240	4820

Table 21-7

ADDITIONAL CONDUCTOR INFORMATION

Solid Aluminum and Copper Conductors

Conductor Size, AWG or kcmil	Approximate Weight			
	Aluminum		Copper	
	Pounds per 1000 Feet	g/m	Pounds per 1000 Feet	g/m
22	...	...	1.94	2.88
20	...	...	3.10	4.61
19	...	...	3.90	5.81
18	...	...	4.92	7.32
17	...	...	6.21	9.24
16	...	...	7.81	11.6
15	...	...	9.87	14.7
14	...	...	12.4	18.5
13	...	...	15.7	23.4
12	6.01	8.94	19.8	29.4
11	7.57	11.3	24.9	37.1
10	9.56	14.22	31.43	46.77
9	12.04	17.92	39.62	58.95
8	15.20	22.62	49.98	74.38
7	19.16	28.52	63.03	93.80
6	24.15	35.94	79.44	118.2
5	30.45	45.32	100.2	149.0
4	38.41	57.17	126.3	188.0
3	48.43	72.08	159.3	237.1
2	61.07	90.89	200.9	298.9
1	77.03	114.6	253.3	377.0
1/0	97.15	144.6	319.5	475.5
2/0	122.5	182.3	402.8	599.5
3/0	154.4	229.8	507.8	755.8
4/0	194.7	289.8	640.5	953.2
250	230.1	342.4	...	...
300	276.1	410.9	...	...
350	322.1	479.4	...	...
400	368.2	547.9	...	...
450	414.4	616.3	...	...
500	460.2	648.8	...	...

Table 21-8

Concentric Stranded Class B Aluminum and Copper Conductors

Conductor Size, AWG or kcmil	Number of Strands	Approximate Diameter of Each Strand		Approximate Outside Diameter		Approximate Weight			
						Aluminum		Copper	
		mils	mm	inches	mm	Pounds per 1000 Feet	g/m	Pounds per 1000 Feet	g/m
22	7	9.6	0.244	0.029	0.737	...	...	1.975	2.941
20	7	12.1	0.307	0.036	0.914	...	...	3.154	4.705
19	7	13.6	0.345	0.041	1.04	...	...	3.974	5.922
18	7	15.2	0.386	0.046	1.17	...	...	5.015	7.462
17	7	17.2	0.437	0.052	1.32	...	...	6.324	9.429
16	7	19.2	0.488	0.058	1.47	...	...	7.974	11.86
15	7	21.6	0.549	...	...	...	...	9.959	14.98
14	7	24.2	0.615	...	...	...	...	12.68	18.88
13	7	27.2	0.691	...	...	...	...	16.01	23.82
12	7	30.5	0.775	...	...	6.13	9.12	20.16	30.00
11	7	34.3	0.871	...	...	7.72	11.5	25.49	37.80
10	7	38.5	0.978	...	...	9.75	14.5	32.06	47.71
9	7	43.2	1.10	...	...	12.3	18.3	40.42	60.14
8	7	48.6	1.23	...	...	15.5	23.1	51.0	75.9
7	7	54.5	1.39	...	...	19.5	29.1	64.2	95.7
6	7	61.2	1.56	...	...	24.6	36.7	80.9	121
5	7	68.8	1.75	...	...	31.1	46.2	102	152
4	7	77.2	1.96	...	...	39.2	58.3	129	192
3	7	86.7	2.20	...	...	49.4	73.5	162	242
2	7	97.4	2.47	...	...	62.3	92.7	205	305
1	19	66.4	1.69	...	...	78.6	117	259	385
1/0	19	74.5	1.89	...	...	99.1	147	326	485
2/0	19	83.7	2.13	...	...	125	186	411	611
3/0	19	94.0	2.39	...	...	157	234	518	771
4/0	19	105.5	2.68	...	...	199	296	653	972
250	37	82.2	2.09	...	...	235	349	772	1150
300	37	90.0	2.29	...	...	282	419	925	1380
350	37	97.3	2.47	...	...	329	489	1080	1610
400	37	104.0	2.64	...	...	376	559	1236	1840
450	37	110.3	2.80	...	...	422	629	1390	2070
500	37	116.2	2.95	...	...	469	699	1542	2300
550	61	95.0	2.41	...	...	517	768	1700	2530
600	61	99.2	2.52	...	...	563	838	1850	2760
650	61	103.2	2.62	...	...	610	908	2006	2990
700	61	107.1	2.72	...	...	657	978	2160	3220
750	61	110.9	2.82	...	...	704	1050	2316	3450
800	61	114.5	2.91	...	...	751	1120	2469	3680
900	61	121.5	3.09	...	...	845	1260	2780	4140
1000	61	128.0	3.25	...	...	939	1400	3086	4590
1100	91	109.9	2.79	...	...	1032	1540	3394	5050
1200	91	114.8	2.92	...	...	1126	1680	3703	5510
1250	91	117.2	2.98	...	...	1173	1750	3859	5740
1300	91	119.5	3.04	...	...	1220	1820	4012	5970
1400	91	124.0	3.15	...	...	1313	1960	4320	6430
1500	91	128.4	3.26	...	...	1408	2100	4632	6890
1600	127	112.2	2.85	...	...	1501	2240	4936	7350
1700	127	115.7	2.94	...	...	1596	2370	5249	7810
1750	127	117.4	2.98	...	...	1643	2440	5403	8040
1800	127	119.1	3.02	...	...	1691	2510	5562	8270
1900	127	122.3	3.11	...	...	1783	2650	5865	8730
2000	127	125.5	3.19	...	...	1877	2790	6176	9190

Table 21-9

Concentric Stranded Class C and D Aluminum and Copper Conductors

Conductor Size, AWG or kcmil	Class C			Class D		
	Number of Strands	Approximate Diameter of Each Strand		Number of Strands	Approximate Diameter of Each Strand	
		mils	mm		mils	mm
22	...	...	...	...	...	...
20	...	...	...	...	...	...
19	...	...	...	...	...	...
18	...	...	...	...	...	...
17	...	...	...	...	...	...
16	...	...	...	...	...	...
15	...	...	...	...	...	...
14	19	14.7	0.373	37	10.5	0.267
13	19	16.5	0.419	37	11.8	0.300
12	19	18.5	0.470	37	13.3	0.338
11	19	20.8	0.528	37	14.9	0.378
10	19	23.4	0.594	37	16.7	0.424
9	19	26.2	0.665	37	18.8	0.478
8	19	29.5	0.749	37	21.1	0.536
7	19	33.1	0.841	37	23.7	0.602
6	19	37.2	0.945	37	26.6	0.676
5	19	41.7	1.06	37	29.9	0.759
4	19	46.9	1.19	37	33.6	0.853
3	19	52.6	1.34	37	37.7	0.958
2	19	59.1	1.50	37	42.4	1.08
1	37	47.6	1.21	61	37.0	0.940
1/0	37	53.4	1.36	61	41.6	1.06
2/0	37	60.0	1.52	61	46.7	1.19
3/0	37	67.3	1.71	61	52.4	1.33
4/0	37	75.6	1.92	61	58.9	1.50
250	61	64.0	1.63	91	52.4	1.33
300	61	70.1	1.78	91	57.4	1.46
350	61	75.7	1.92	91	62.0	1.57
400	61	81.0	2.06	91	66.3	1.68
450	61	85.9	2.18	91	70.3	1.79
500	61	90.5	2.30	91	74.1	1.88
550	91	77.7	1.97	127	65.8	1.67
600	91	81.2	2.06	127	68.7	1.74
650	91	84.5	2.15	127	71.5	1.82
700	91	87.7	2.23	127	74.2	1.88
750	91	90.8	2.31	127	76.8	1.95
800	91	93.8	2.38	127	79.4	2.02
900	91	99.4	2.53	127	84.2	2.14
1000	91	104.8	2.66	127	88.7	2.25
1100	127	93.1	2.36	169	80.7	2.05
1200	127	97.2	2.47	169	84.3	2.14
1250	127	99.2	2.52	169	86.0	2.18
1300	127	101.2	2.57	169	87.7	2.23
1400	127	105.0	2.67	169	91.0	2.31
1500	127	108.7	2.76	169	94.2	2.39
1600	169	97.3	2.47	217	85.9	2.18
1700	169	100.3	2.55	217	88.5	2.25
1750	169	101.8	2.59	217	89.8	2.28
1800	169	103.2	2.62	217	91.1	2.31
1900	169	106.0	2.69	217	93.6	2.38
2000	169	108.8	2.76	217	96.0	2.44

NOTE: The weights of Class C and Class D conductors are the same as for the equivalent Class B conductor

Table 21-10

Rope-Lay Aluminum and Copper Conductors, Class G

Conductor Size, AWG or kcmil	Number of Strands	Suggested Con- struction	Approximate Diameter of Each Strand		Approximate Outside Diameter		Approximate Weight			
			mils	mm	inches	mm	Aluminum		Copper	
							Pounds per 1000 Feet	g/m	Pounds per 1000 Feet	g/m
14	49	7 × 7	9.2	0.23	0.083	2.11	...	...	12.8	19.1
12	49	7 × 7	11.6	0.29	0.104	2.64	...	...	20.3	30.3
10	49	7 × 7	14.6	0.37	0.131	3.33	...	...	32.3	48.2
9	49	7 × 7	16.4	0.42	0.148	3.76	...	...	40.8	60.7
8	49	7 × 7	18.4	0.47	0.166	4.22	...	...	51	76.6
7	49	7 × 7	20.6	0.52	0.185	4.70	20	29.4	65	96.6
6	49	7 × 7	23.1	0.59	0.208	5.28	25	37.0	82	122
5	49	7 × 7	26.0	0.66	0.234	5.94	31	46.7	103	154
4	49	7 × 7	29.2	0.74	0.263	6.68	40	58.9	130	194
3	49	7 × 7	32.8	0.83	0.295	7.49	50	74.2	164	244
2	49	7 × 7	36.8	0.93	0.331	8.41	63	93.6	207	308
1	133	19 × 7	25.1	0.64	0.377	9.58	80	119	264	392
1/0	133	19 × 7	28.2	0.72	0.423	10.7	102	150	334	495
2/0	133	19 × 7	31.6	0.80	0.474	12.0	127	190	419	623
3/0	133	19 × 7	35.5	0.90	0.533	13.5	161	239	529	786
4/0	133	19 × 7	39.9	1.01	0.599	15.2	203	301	668	991
250	259	37 × 7	31.1	0.79	0.653	16.6	242	358	795	1175
300	259	37 × 7	34.0	0.86	0.714	18.1	287	429	945	1410
350	259	37 × 7	36.8	0.93	0.773	19.6	337	501	1110	1650
400	259	37 × 7	39.3	1.00	0.825	21.0	385	573	1265	1885
450	259	37 × 7	41.7	1.06	0.876	22.3	433	644	1425	2120
500	259	37 × 7	43.9	1.12	0.922	23.4	482	716	1585	2355
550	427	61 × 7	35.9	0.91	0.969	24.6	532	791	1750	2600
600	427	61 × 7	37.5	0.95	1.013	25.7	581	863	1910	2840
650	427	61 × 7	39.0	0.99	1.053	26.7	629	935	2070	3075
700	427	61 × 7	40.5	1.03	1.094	27.8	678	1005	2230	3310
750	427	61 × 7	41.9	1.06	1.131	28.7	725	1080	2385	3545
800	427	61 × 7	43.3	1.10	1.169	29.7	774	1150	2545	3785
900	427	61 × 7	45.9	1.17	1.239	31.3	869	1295	2860	4255
1000	427	61 × 7	48.4	1.23	1.307	33.2	967	1440	3180	4730
1100	427	61 × 7	50.8	1.29	1.372	34.8	1064	1580	3500	5205
1200	427	61 × 7	53.0	1.35	1.431	36.3	1158	1725	3810	5675
1250	427	61 × 7	54.1	1.37	1.461	37.1	1208	1800	3975	5910
1300	427	61 × 7	55.2	1.40	1.490	37.8	1257	1870	4135	6150
1400	427	61 × 7	57.3	1.46	1.547	39.3	1356	2015	4460	6620
1500	427	61 × 7	59.3	1.51	1.601	40.7	1452	2155	4775	7095
1600	703	37 × 19	47.7	1.21	1.670	42.4	1560	2325	5130	7640
1700	703	37 × 19	49.2	1.25	1.722	43.7	1660	2470	5460	8115
1750	703	37 × 19	49.9	1.27	1.747	44.4	1709	2540	5620	8355
1800	703	37 × 19	50.6	1.29	1.771	45.0	1756	2615	5775	8595
1900	703	37 × 19	52.0	1.32	1.820	46.2	1854	2760	6100	9070
2000	703	37 × 19	53.3	1.35	1.866	47.4	1950	2905	6415	9550

NOTE: Rope-lay aluminum Class G conductors are not recommended in sizes 8 AWG and smaller and individual aluminum wires in stranded conductors should not be smaller than 24 AWG.

Table 21-11

Rope-Lay Aluminum and Copper Conductors, Class H

Conductor Size, AWG or kcmil	Number of Strands	Suggested Con- struction	Approximate Diameter of Each Strand		Approximate Outside Diameter		Approximate Weight			
			mils	mm	inches	mm	Aluminum		Copper	
							Pounds per 1000 Feet	g/m	Pounds per 1000 Feet	g/m
8	133	19 × 7	11.1	0.28	0.167	4.24	...	...	52	77.4
7	133	19 × 7	12.5	0.32	0.188	4.78	...	...	65	97.5
6	133	19 × 7	14.0	0.36	0.210	5.33	...	...	82	123
5	133	19 × 7	15.8	0.40	0.237	6.02	...	...	105	155
4	133	19 × 7	17.7	0.45	0.266	6.76	...	...	132	196
3	133	19 × 7	19.9	0.51	0.299	7.59	...	...	167	247
2	133	19 × 7	22.3	0.57	0.335	8.51	63	94.5	208	311
2	259	37 × 7	16.0	0.41	0.336	8.53	...	...	210	312
1	259	37 × 7	18.0	0.46	0.378	9.60	...	...	266	394
1/0	259	37 × 7	20.2	0.51	0.424	10.8	102	151	334	497
2/0	259	37 × 7	22.7	0.58	0.477	12.1	128	190	422	626
3/0	259	37 × 7	25.5	0.65	0.536	13.6	162	240	533	790
3/0	427	61 × 7	19.8	0.50	0.535	13.6	...	...	532	794
4/0	259	37 × 7	28.6	0.73	0.601	15.3	204	303	670	996
4/0	427	61 × 7	22.3	0.57	0.602	15.3	205	304	675	1000
250	427	61 × 7	24.2	0.61	0.653	16.6	242	360	795	1180
300	427	61 × 7	26.5	0.67	0.716	18.2	290	431	953	1420
350	427	61 × 7	28.6	0.73	0.772	19.6	337	503	1110	1655
400	427	61 × 7	30.6	0.78	0.826	21.0	386	575	1270	1890
450	427	61 × 7	32.5	0.83	0.878	22.3	436	647	1435	2130
500	427	61 × 7	34.2	0.87	0.923	23.4	483	719	1590	2365
550	703	37 × 19	28.0	0.71	0.980	24.9	538	798	1770	2625
600	703	37 × 19	29.2	0.74	1.022	26.0	584	871	1920	2865
650	703	37 × 19	30.4	0.77	1.064	27.0	634	944	2085	3105
700	703	37 × 19	31.6	0.80	1.106	28.1	686	1015	2255	3340
750	703	37 × 19	32.7	0.83	1.145	29.1	733	1090	2410	3580
800	703	37 × 19	33.7	0.86	1.180	30.0	778	1160	2560	3820
900	703	37 × 19	35.8	0.91	1.253	31.8	880	1305	2895	4295
1000	703	37 × 19	37.7	0.96	1.320	33.5	974	1450	3205	4775
1100	703	37 × 19	39.6	1.01	1.386	35.2	1075	1595	3535	5250
1200	703	37 × 19	41.3	1.05	1.446	36.7	1169	1740	3845	5730
1250	703	37 × 19	42.2	1.07	1.477	37.5	1221	1815	4015	5970
1300	703	37 × 19	43.0	1.09	1.505	38.2	1268	1885	4170	6205
1400	703	37 × 19	44.6	1.13	1.561	39.6	1363	2035	4485	6685
1500	703	37 × 19	46.2	1.17	1.617	41.1	1464	2180	4815	7160
1600	1159	61 × 19	37.2	0.94	1.674	42.5	1564	2325	5145	7640
1700	1159	61 × 19	38.3	0.97	1.724	43.8	1658	2470	5455	8115
1750	1159	61 × 19	38.9	0.99	1.751	44.5	1710	2540	5625	8355
1800	1159	61 × 19	39.4	1.00	1.773	45.0	1754	2615	5770	8595
1900	1159	61 × 19	40.5	1.03	1.823	46.3	1854	2760	6100	9070
2000	1159	61 × 19	41.5	1.05	1.868	47.4	1946	2905	6400	9550

NOTE: Individual aluminum wires in stranded conductors should not be smaller than 24 AWG.

Table 21-12

Aluminum and Copper Conductors, Class I
Each Individual Strand 24 AWG, 0.0201 Inch (0.511 mm)

Conductor Size, AWG or kcmil	Suggested Con- struction	Approximate Number of Strands	Approximate Outside Diameter		Approximate Weight			
					Aluminum		Copper	
			inches	mm	Pounds per 1000 Feet	g/m	Pounds per 1000 Feet	g/m
10	1 × 26	26	0.125	3.18	...	...	32.5	48.3
9	1 × 33	33	0.138	3.51	...	...	41	61.3
8	1 × 41	41	0.156	3.96	16	23.1	51	76.1
7	1 × 52	52	0.185	4.70	20	29.3	65	96.5
6	7 × 9	63	0.207	5.26	24	36.3	80	119
5	7 × 12	84	0.235	5.97	32	48.3	105	159
4	7 × 15	105	0.263	6.68	41	60.4	134	199
3	7 × 19	133	0.291	7.39	51	76.5	169	252
2	7 × 23	161	0.319	8.10	62	92.7	205	305
1	7 × 30	210	0.367	9.32	81	121	267	397
1/0	19 × 14	266	0.441	11.2	104	155	342	508
2/0	19 × 18	342	0.500	12.7	133	199	439	654
3/0	19 × 22	418	0.549	13.9	163	243	537	799
4/0	19 × 28	532	0.613	15.6	208	309	683	1015
250	7 × 7 × 13	637	0.682	17.3	251	374	825	1230
300	7 × 7 × 15	735	0.737	18.7	290	431	955	1420
350	7 × 7 × 18	882	0.800	20.3	348	517	1145	1700
400	7 × 7 × 20	980	0.851	21.1	386	575	1270	1890
450	7 × 7 × 23	1127	0.894	22.7	444	661	1460	2175
500	7 × 7 × 25	1225	0.941	23.9	483	719	1590	2365
550	7 × 7 × 28	1372	0.980	24.9	541	805	1780	2645
600	7 × 7 × 30	1470	1.027	26.1	579	862	1905	2835
650	19 × 7 × 12	1596	1.152	29.3	633	945	2090	3110
700	19 × 7 × 13	1729	1.194	30.3	687	1025	2260	3365
750	19 × 7 × 14	1862	1.235	31.4	740	1100	2435	3625
800	19 × 7 × 15	1995	1.290	32.8	793	1180	2610	3885
900	19 × 7 × 17	2261	1.372	34.8	901	1340	2965	4405
1000	19 × 7 × 19	2527	1.427	36.2	1005	1495	3305	4920
1100	19 × 7 × 21	2793	1.495	38.0	1111	1655	3655	5440
1200	19 × 7 × 22	2926	1.537	39.0	1164	1730	3830	5700
1250	19 × 7 × 23	3059	1.564	39.7	1216	1810	4000	5955
1300	19 × 7 × 24	3192	1.605	40.8	1269	1890	4175	6215
1400	19 × 7 × 26	3458	1.674	42.5	1386	2045	4560	6735
1500	19 × 7 × 28	3724	1.715	43.6	1482	2205	4875	7250
1600	19 × 7 × 30	3990	1.797	45.6	1587	2360	5220	7770
1700	19 × 7 × 32	4256	1.852	47.0	1693	2520	5570	8290
1750	19 × 7 × 33	4389	1.880	47.8	1746	2600	5745	8545
1800	19 × 7 × 34	4522	1.921	48.8	1800	2675	5920	8805
1900	19 × 7 × 36	4788	1.976	50.2	1905	2835	6265	9325
2000	19 × 7 × 37	4921	2.003	50.9	1958	2915	6440	9585

NOTE: Aluminum Class I conductors are not recommended in sizes 8 AWG and smaller.

Table 21-13

Copper Conductors, Class K
Each Individual Strand 30 AWG, 0.0100 Inch (0.254 mm)

Conductor Size, AWG or kcmil	Suggested Construction	Approximate Number of Strands	Approximate Outside Diameter		Approximate Weight	
			Inches	mm	Pounds per 1000 Feet	g/m
20	1 × 10	10	0.038	0.97	3.2	4.59
18	1 × 16	16	0.048	1.22	5.0	7.35
16	1 × 26	26	0.060	1.52	8.0	11.9
14	1 × 41	41	0.078	1.98	12.8	18.8
12	1 × 65	65	0.101	2.57	20.3	29.9
10	1 × 104	104	0.126	3.20	32.5	47.8
9	7 × 19	133	0.150	3.81	42	62.3
8	7 × 24	168	0.157	3.99	53	78.7
7	7 × 30	210	0.179	4.55	66	98.4
6	7 × 38	266	0.210	5.33	84	125
5	7 × 48	336	0.235	5.97	106	157
4	7 × 60	420	0.272	6.91	132	197
3	19 × 28	532	0.304	7.72	169	252
2	19 × 35	665	0.338	8.59	211	315
1	19 × 44	836	0.397	10.1	266	395
1/0	19 × 56	1064	0.451	11.5	338	503
2/0	7 × 7 × 27	1323	0.470	11.9	425	632
3/0	7 × 7 × 34	1666	0.533	13.5	535	795
4/0	7 × 7 × 43	2107	0.627	15.9	676	1005
250	7 × 7 × 51	2499	0.682	17.3	802	1195
300	7 × 7 × 61	2989	0.768	19.5	960	1425
350	19 × 7 × 26	3458	0.809	20.5	1120	1665
400	19 × 7 × 30	3990	0.878	22.3	1290	1925
450	19 × 7 × 34	4522	0.933	23.7	1465	2180
500	19 × 7 × 38	5054	0.988	25.1	1635	2435
550	19 × 7 × 41	5453	1.056	26.8	1765	2630
600	19 × 7 × 45	5985	1.125	28.6	1940	2885
650	19 × 7 × 49	6517	1.166	29.6	2110	3140
700	19 × 7 × 52	6916	1.207	30.7	2240	3335
750	19 × 7 × 57	7581	1.276	32.4	2455	3655
800	19 × 7 × 60	7980	1.305	33.1	2585	3845
900	37 × 7 × 35	9065	1.323	33.6	2935	4370
1000	37 × 7 × 39	10101	1.419	36.0	3270	4870